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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/891,134	06/25/2001	Peter Brian Denyer	00ED18552605	8833

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EXAMINER	
HENN, TIMOTHY J	
ART UNIT	**PAPER NUMBER**
2612	

DATE MAILED: 12/01/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/891,134	DENYER ET AL.	
	Examiner	Art Unit	
	Timothy J Henn	2612	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *25 June 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *12-31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *12-31* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *04 September 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *6/25/01, 2/12/02*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 12, 13, 15, 16 and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Dierickx et al. (EP 0 858 212 A1).

[claim 12]

Regarding claim 12, Dierickx discloses a method of operating a solid state image sensing array comprising a plurality of active pixels (Figure 1a) comprising: resetting each pixel (Figure 5; "reset"); reading a first output from each pixel after a first period of time to obtain a first set of image data having a first dynamic range (Figure 5; "sample" and "signal"; c. 7, ll. 23-32); reading a second output from each pixel after a second period of time and without resetting each pixel to obtain a second set of image data having a second dynamic range (Figure 5; "reset", "sample" and "signal"; c. 7, ll. 23-32); and combining the first and second sets of image data to obtain a resultant set of image data having a dynamic range different from the first and second dynamic ranges (Figures 3a, 3b; c. 7, ll. 36-49).

[claim 13]

Regarding claim 13, Dierickx discloses that signals for more than two integration periods can be obtain and combined (see claim 2 of Dierickx).

[claim 15]

Regarding claim 15, Dierickx discloses a method wherein the image sensing array remains continuously exposed to incident light when the resetting is performed, and when the reading of the first and second outputs are performed (Figure 5).

[claim 16]

Regarding claim 16, Dierickx discloses a method of operation a solid state image sensing array comprising a plurality of active pixels (Figure 1a) , the method comprising: resetting and immediately reading a preliminary output form each of the pixels (Figure 5, note the first "reset" and "sample" signals) and reading a first output from each pixel after a first period of time (Figure 5, "sample"; c. 7, ll. 23-32).

[claim 19]

Regarding claim 19, Dierickx discloses a method wherein the image sensing array remains continuously exposed to incident light when the resetting is performed, and when the reading of the preliminary and first outputs are performed (Figure 5).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 14 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dierickx (EP 0 858 212 A1) in view of Applicants Admitted Prior Art (AAPA).

[claim 14]

Regarding claim 14, Dierickx discloses all limitations except for exposure periods which are integer multiples of a predetermined lighting flicker period. However, AAPA discloses that CMOS image sensors suffer from horizontal banding interference when the exposure time is not an integer multiple of a light source flicker period (Page 2, Line 21 - Page 3, Line 1). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make the integration times of the image sensor of Dierickx integer multiples of a lighting flicker period to correct horizontal banding interference in the image.

[claim 18]

Regarding claim 18, see Examiner's notes for claim 14.

5. Claims 17 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dierickx (EP 0 858 212 A1) in view of Fossum (US 5,471,515).

[claim 17]

Regarding claim 17, Dierickx discloses subtracting a signal value (i.e. "a", "b") from a reset value (i.e. "c") to obtain a set of image data substantially free of noise components (c. 7, ll. 29-42). However, Dierickx discloses obtaining a reset value after resetting the pixels and subtracting signal values from the previous exposures with the newly obtained reset value (Figure 5).

Fossum teaches that due to kTC noise it is impossible to reset a diode to the same initial voltage at the beginning of each integration period (c. 1, ll. 54-61). To solve this problem Fossum teaches first obtaining a reset value and subtracting a signal value obtained an integration period of the reset value is obtained from the reset value (c. 2, ll. 29-40) to eliminate the effects of variations in the reset voltage caused by kTC noise (c. 4, ll. 24-27). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to obtain a reset value (i.e. "c") prior to obtaining the signal values (i.e. "a", "b") as taught by Fossum to remove the effects of kTC noise on the reset voltage.

[claim 20]

Regarding claim 20, Dierickx discloses obtaining a second output from each pixel after a second period of time and without resetting each pixel to obtain a second set of image data having a second dynamic range (i.e. "b"); and determining a difference between a reset value and each of the first (i.e. "a"), second (i.e. "b") and any subsequent (see claim 2) outputs to obtain a plurality of sets of image data each of which is substantially free of noise components. Dierickx discloses obtaining a reset value after resetting the pixels and subtracting signal values from the previous exposures with the newly obtained reset value (Figure 5).

Fossum teaches that due to kTC noise it is impossible to reset a diode to the same initial voltage at the beginning of each integration period (c. 1, ll. 54-61). To solve this problem Fossum teaches first obtaining a reset value and subtracting a signal value obtained an integration period of the reset value is obtained from the reset value (c. 2, ll.

29-40) to eliminate the effects of variations in the reset voltage caused by kTC noise (c. 4, ll. 24-27). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to obtain a reset value (i.e. "c") prior to obtaining the signal values (i.e. "a", "b") as taught by Fossum to remove the effects of kTC noise on the reset voltage.

6. Claims 21, 22, 24-26, 29 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hurwitz et al. (US 6,067,113) in view of Dierickx (EP 0 858 212 A1).

[claim 21]

Regarding claim 21, Hurwitz discloses a solid state image sensor (Figure 1) comprising: a plurality of active pixels (Figure 1, Item 2); a vertical shift register connected to rows of said plurality of active pixels (Figure 2, Item 20) and a horizontal shift register connected to columns of said plurality of active pixels (Figure 2, Item 22). However, Hurwitz does not disclose scanning circuitry connected to said vertical and horizontal shift registers for reading said plurality of active pixels by resetting each pixel, reading a first output from each pixel after a first period of time to obtain a first set of image data having a first dynamic range, reading a second output from each pixel after a second period of time and without resetting each pixel to obtain a second set of image data having a second dynamic range, and combining the first and second sets of image data to obtain a resultant set of image data having a dynamic range different from the first and second dynamic ranges.

However, Dierickx discloses operating a solid state image sensing array by resetting each pixel (Figure 5; "reset"); reading a first output from each pixel after a first period of time to obtain a first set of image data having a first dynamic range (Figure 5; "sample" and "signal"; c. 7, ll. 23-32); reading a second output from each pixel after a second period of time and without resetting each pixel to obtain a second set of image data having a second dynamic range (Figure 5; "reset", "sample" and "signal"; c. 7, ll. 23-32); and combining the first and second sets of image data to obtain a resultant set of image data having a dynamic range different from the first and second dynamic ranges (Figures 3a, 3b; c. 7, ll. 36-49). Dierickx discloses that by reading out the image sensing array in such a manner a large dynamic range can be obtained (c. 1, ll. 5-10). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to implement the readout as taught by Dierickx with the solid state image sensing array of Hurwitz to obtain an output with a large dynamic range.

[claim 22]

Regarding claim 22, Dierickx discloses that signals for more than two integration periods can be obtain and combined (see claim 2 of Dierickx).

[claim 24]

Regarding claim 24, Dierickx discloses an image sensing array that remains continuously exposed to incident light when the resetting is performed, and when the reading of the first and second outputs are performed (Figure 5).

[claim 25]

Regarding claim 25, Hurwitz in view of Dierickx discloses the use of the plurality of active pixels, the vertical and horizontal shift registers and scanning circuitry, in a camera system (Hurwitz; c. 9, ll. 10-23; Dierickx; c. 1, ll. 18-23).

[claim 26]

Regarding claim 26, Hurwitz discloses a solid state image sensor (Figure 1) comprising: a plurality of active pixels (Figure 1, Item 2); a vertical shift register connected to rows of said plurality of active pixels (Figure 2, Item 20) and a horizontal shift register connected to columns of said plurality of active pixels (Figure 2, Item 22). However, Hurwitz does not disclose scanning circuitry connected to said vertical and horizontal shift registers for reading said plurality of active pixels by resetting and immediately reading a preliminary output form each pixel, and reading a first output from each pixel after a first period of time.

However, Dierickx discloses operating a solid state image sensing array comprising a plurality of active pixels (Figure 1a), by resetting and immediately reading a preliminary output form each of the pixels (Figure 5, note the first "reset" and "sample" signals) and reading a first output from each pixel after a first period of time (Figure 5, "sample"; c. 7, ll. 23-32). Dierickx discloses that by reading out the image sensing array in such a manner a large dynamic range can be obtained (c. 1, ll. 5-10). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to implement the readout as taught by Dierickx with the solid state image sensing array of Hurwitz to obtain an output with a large dynamic range.

[claim 29]

Regarding claim 29, Dierickx discloses an image sensing array that remains continuously exposed to incident light when the resetting is performed, and when the reading of the first and second outputs are performed (Figure 5).

[claim 31]

Regarding claim 31, Hurwitz in view of Dierickx discloses the use of the plurality of active pixels, the vertical and horizontal shift registers and scanning circuitry, in a camera system (Hurwitz; c. 9, ll. 10-23; Dierickx; c. 1, ll. 18-23).

7. Claims 23 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hurwitz et al. (US 6,067,113) in view of Dierickx (EP 0 858 212 A1) in view of Applicants Admitted Prior Art (AAPA).

[claims 23 and 28]

Regarding claims 23 and 28, Hurwitz in view of Dierickx discloses all limitations except for exposure periods which are integer multiples of a predetermined lighting flicker period. However, AAPA discloses that CMOS image sensors suffer from horizontal banding interference when the exposure time is not an integer multiple of a light source flicker period (Page 2, Line 21 - Page 3, Line 1). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make the integration times of the image sensor of Hurwitz in view of Dierickx integer multiples of a lighting flicker period to correct horizontal banding interference in the image.

8. Claims 27 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hurwitz et al. (US 6,067,113) in view of Dierickx (EP 0 858 212 A1) in further view of Fossum et al. (US 5,471,515).

[claim 27]

Regarding claim 27, Hurwitz in view of Dierickx discloses subtracting a signal value (i.e. "a", "b") from a reset value (i.e. "c") to obtain a set of image data substantially free of noise components (c. 7, ll. 29-42). However, Dierickx discloses obtaining a reset value after resetting the pixels and subtracting signal values from the previous exposures with the newly obtained reset value (Figure 5).

Fossum teaches that due to kTC noise it is impossible to reset a diode to the same initial voltage at the beginning of each integration period (c. 1, ll. 54-61). To solve this problem Fossum teaches first obtaining a reset value and subtracting a signal value obtained an integration period of the reset value is obtained from the reset value (c. 2, ll. 29-40) to eliminate the effects of variations in the reset voltage caused by kTC noise (c. 4, ll. 24-27). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to obtain a reset value (i.e. "c") prior to obtaining the signal values (i.e. "a", "b") as taught by Fossum to remove the effects of kTC noise on the reset voltage.

[claim 30]

Regarding claim 30, Dierickx discloses obtaining a second output from each pixel after a second period of time and without resetting each pixel to obtain a second set of image data having a second dynamic range (i.e. "b"); and determining a difference

between a reset value and each of the first (i.e. "a"), second (i.e. "b") and any subsequent (see claim 2) outputs to obtain a plurality of sets of image data each of which is substantially free of noise components. Dierickx discloses obtaining a reset value after resetting the pixels and subtracting signal values from the previous exposures with the newly obtained reset value (Figure 5).

Fossum teaches that due to kTC noise it is impossible to reset a diode to the same initial voltage at the beginning of each integration period (c. 1, ll. 54-61). To solve this problem Fossum teaches first obtaining a reset value and subtracting a signal value obtained an integration period of the reset value is obtained from the reset value (c. 2, ll. 29-40) to eliminate the effects of variations in the reset voltage caused by kTC noise (c. 4, ll. 24-27). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to obtain a reset value (i.e. "c") prior to obtaining the signal values (i.e. "a", "b") as taught by Fossum to remove the effects of kTC noise on the reset voltage.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following prior art further shows the current state of the art in imaging devices which combine multiple signals into a single image:

i.	Merrill	US 5,892,541
ii.	Levine et al.	US 6,040,570
iii.	Kakinuma et al.	US 6,744,471

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Timothy J Henn whose telephone number is (703) 305-8327. The examiner can normally be reached on M-F 9:00 AM - 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wendy R Garber can be reached on (703) 305-4929. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

TJH
11/24/2004

TUAN HO
PRIMARY EXAMINER